

Cables that Run from the Existing
BLS Trigger Tower Pickoff Signal Cables to ADF Backplane

Original Rev. 9-APR-2004
Most Recent Rev. 10-APR-2004

This file provides some background information about the "extension cables" that need to be designed and manufactured to run from the existing BLS Trigger Tower Pickoff Signals Cables (aka the blue cables) to the ADF backplane.

Existing BLS Trigger Pickoff Cables

These cables were installed at the very beginning of Run I. They are made of 0.1" diameter ribbon coaxial cable. 4 adjacent coax cables in a ribbon are used to carry the differential EM and HD signals for a given Trigger Tower. This ribbon coax cable was made by a company called New England Wire. The slang name for these cables is "the Blue cables".

There are actually two types of this cable: most of it is Blue but some of the high eta cables are Gray. The Zo of these two types is different: one kind is 80 Ohm and the other is 78 Ohm. In designing the Run I and Run IIA circuits to receive the BLS Trigger Pickoff Signals all terminators were designed for 79 Ohm.

At the MCH-1 end these ribbon coax cables end in an 8 pin Amphenol connector. This 8 pin connector carries all the signals for one full Trigger Tower. The pinout looking into the connector is:

pin #1 -->	EM+	EM-	HD+	HD-	<-- upper row of pins
	Gnd	Gnd	Gnd	Gnd	<-- lower row of pins

On the connector the Gnd under each signal is the shield of the coax cable that carries that signal. The connector is an Amphenol part number 813-0802-035. It is an 8 pin (2x4) 0.1" x 0.1" spaced contacts female connector. It receives standard 25 mil square contacts.

In the current L1 Cal Trig system these Amphenol connectors on the Blue Cables plug into AMP Part Number 103167-1 connectors on the L1 Cal Trig CTFE circuit boards.

Run IIB Extension Cables to run to the ADF Backplane

The proposed raw cable to make these Extension Cables is manufactured by Madison Cable Corp. It is their Specification Number 13164 cable. The data sheet for this cable is on the web at:

www.pa.msu.edu/hep/d0/ftp/run2b/l1cal/hardware/component_information/

bls_to_adf_cable.pdf

I do not think that this cable has been tested with real signals. Note that this cable has different characteristics than the existing Blue ribbon coax cable. I do not think that any tests have been made with either sin wave or pulser signals making a transition from the existing Blue cable to the proposed extension cable. Tests for reflection and cross talk are needed.

The connector used at the "BLS Cable" end of the Run IIB Extension Cables depends on whether or not a "bulkhead feed through" type of interface is made between these two cables or if one cable is just plugged into another. Connectors to start with, perhaps just for prototypes, might be:

AMP part number	87631-4	housing 8 position 2x4 0.1" x 0.1"
AMP part number	102107-3	male pin (to plug directly into the existing BLS cable connector)
AMP part number	1-87309-4	female contact (if you are using a feed through bulk head connector between the two cables)

Information on these parts is on the web from AMP (TYCO).

The connector used at the ADF Backplane end of the Run IIB Extension Cables could be the following:

ERNI part number	024 070	housing 5x32
ERNI part number	014 748	contact
ERNI part number	173 051	outer cable shell series KSG 173

Information about these parts is at:

www.pa.msu.edu/hep/d0/ftp/run2b/l1cal/hardware/component_information/erni_cable_connectors.pdf

The pinout of this ADF Backplane connector is defined in, "VME P2 Connector BLS Signal Pinout" section of the file at:

www.pa.msu.edu/hep/d0/ftp/run2b/l1cal/hardware/adf_2/general/adf_2_design_layout.txt

Note that which signal is which, i.e. which signal is which TT in the 4x4 array of TT's serviced by a given ADF card, is just a matter of what label is put on each of the 32 cables that make up these Run IIB Extension Cables.

Background Information

Date: Mon, 12 Mar 2001 12:17:40 -0500 (EST)
From:

To:
 Subject: Connector part number to receive the blue cable

Hello ,

The connector on the circuit board that receives the "Blue Cables" is an AMP connector, AMP Part Number 103167-1.

I just checked at the AMP web site (www.amp.com) and this connector appears to be an "active" product with AMP. The first page of the AMP web site has a part number search feature that took me directly to the details about this connector.

For reference, the connector that is on the end of the Blue Cable is Amphenol part number 813-0802-035. I do not find this part on the Amphenol web site. It could be that they no longer make this connector. If you would like a copy, I do have on paper the drawings and specification for this connector.

Date: Fri, 20 Jul 2001 15:55:56 -0400 (EDT)
 From:
 To:
 Cc:
 Subject: Re: Cables and connectors in DO L1 Calo Trigger

This is an explanation of how the cables are currently used.

Each 0.2 x 0.2 Trigger Tower (TT) has 4 coaxial cables, i.e. EM+, EM-, HD+, HD-. The EM and HD signals are currently carried differentially. The coaxial cables are in ribbons of 16. A ribbon of 16 coax cables carries the signals for 4 TT's

At the BLS end of a ribbon, the ribbon splits into 2 sections, and each section of 8 coaxial cables has a 16 pin connector that plugs into the back of a BLS backplane. This 16 pin connector carries the EM and HD signals for 2 TT's. This connector typically services 2 adjacent BLS Cards. These 2 BLS cards are at adjacent eta's and the same phi. At all but the highest eta, a BLS card is a TT. The 2 highest eta BLS cards at a given phi are 2 TT's each. In all cases, at the BLS end, an 8 coax 16 pin connector is two TT's which are adjacent in eta and at the same phi.

At the Cal Trig end of a 16 coax ribbon, the ribbon splits into 4 sections of 4 coaxes each. Each section of 4 coaxes has an 8 pin connector and is the EM and HD signals for a given TT. Of the 4 TT's on a given ribbon they are typically either:

4 TT's adjacent in eta and at the same phi

or else

2 eta adjacent TT's at the same phi and 2 eta adjacent TT's at the next higher phi.

There are complete descriptions of this cabling on the web in the files:

[http://www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/
central_bls_card_to_ctfe_card.txt](http://www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/central_bls_card_to_ctfe_card.txt)

and

[http://www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/
end_cap_bls_card_to_ctfe_card.txt](http://www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/end_cap_bls_card_to_ctfe_card.txt)

Each of these files shows all of the BLS card to L1 Cal Trig connections for that section of the Calorimeter. At the end of each of these files there is a section giving various options for how to organize the TT's on a given ribbon and how to group the ribbons into bundles that are routed between the Platform and the MCH. In both cases it was "Example #2" that was used. I'm sorry, but the drawings that go with this file are not in the file. I can FAX or scan these drawings if you would like to see them. This may appear to be confusing at first but it is really a very straight forward layout of the cabling. Although in some cases, a given ribbon may carry TT's from two phi's, none of the ribbons are split between racks at either end.

The other files on the web that may help you understand the cabling are:

[http://www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/
calorimeter_sector_to_bls_rack.txt](http://www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/calorimeter_sector_to_bls_rack.txt)
[calorimeter_sector_to_trigger_phi_index.txt](http://www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/calorimeter_sector_to_trigger_phi_index.txt)

[http://www.pa.msu.edu/hep/d0/ftp/l1/cal_trig/drawings/
coordinate_system.gif](http://www.pa.msu.edu/hep/d0/ftp/l1/cal_trig/drawings/coordinate_system.gif) or .ps

Date: Thu, 13 Dec 2001 14:24:15 -0500 (EST)

From:

To:

Cc:

Subject: Re: L1Cal cables

Hello ,

There were two types of cables used to run from the BLS cards in the platform to the L1 Cal Trig in the 1st floor MCH. One of them was made by a company called ASTRO and the other by a company called New England Wire. One type is Blue and the other type is Gray. They are in ribbons of 16 and each coax is 0.1" diameter. One type is 78 Ohm and the other type is 80 Ohm. I'm at Fermi and I do not have the other information, e.g. velocity factor and such, with me.

The lengths are: 130 ft to North EC
 150 ft to CC
 180 ft to South EC

The loss is high:

MHz	dB loss per 100 ft	Voltage ratio
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1	0.60	1.072
2	0.80	1.096
4	1.25	1.15
6	1.48	1.19

8	1.72	1.22
10	1.92	1.25

The connector on the current L1 Cal Trig circuit board that receives the "Blue Cables" is an AMP connector, AMP Part Number 103167-1. I think that Amp 103166-2 is similar. I just checked at the AMP web site and this connector appears to be an "active" product with AMP.

For reference, the connector that is on the end of the Blue Cable is Amphenol part number 813-0802-035. I do not find this part on the Amphenol web site. It could be that they no longer make this connector. If you would like a copy, I do have on paper the drawings and specification for this connector.

I have information on the web about the layout of all of these cables, e.g. what pair of coax in what ribbon in what bundle carry what eta,phi signal. Let me know if you need this and I will send the references and some explanation.

Date: Thu, 27 Dec 2001 12:37:19 -0500 (EST)
 From:
 To:
 Cc:
 Subject: Re: more L1Cal cable questions

Hello ,

From your note:

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>> Input Cables to CTFE boards:
>> - 8-pin connector attached to 4 coax cables from 1 TT (EM & Had)
>> . AMP part number: 103167-1
>> - up to 4 of these connectors plug into each of the input connectors
>> (A,B,C,D) on the CTFE boards
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This is the part of your note where I think you are describing the L1 Cal Trig end of the long cables that run from the BLS crates in the platform to the L1 Cal Trig in the 1st floor MCH.

The connectors on these cables are Amphenol part number 813-0802-035. This is an 8 pin connector that attaches to 4 adjacent coax cables in a ribbon of 16 coax cables. Each of these connectors carries the signals for a given Trigger Tower, i.e. EM+, EM-, Had+, Had- for a given Trigger Tower.

Yes, with the current CTFE cards, and the 40 in eta by 32 in Phi array of Trigger Towers, 4 of these connectors plug into each of the 320 CTFE cards.

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>> CTFE connectors:
>> - 4 of these connectors per board
>> . AMP part number: ?
>> - each connector receives (up to) 4 of the 8-pin input cable connectors
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The connectors on the current CTFE cards are AMP Part Number 103167-1.

This is an 8 pin connector that is soldered into, i.e. part of the CTFE circuit board assembly. This connector is on the AMP web site.

Each CTFE circuit board has 4 of these AMP 103167-1 connectors.

Each AMP 103167-1 connector on a CTFE card receives one Amphenol 813-0802-035 connector, i.e. receives one Trigger Tower.

The Amphenol 813-0802-035 connector is on the end of the long cables from the BLS cards.

Each of the current CTFE cards receive just 4 Trigger Towers (4 adjacent Eta's all at the same Phi).

I'm sorry that the connector part numbers were not clear in my note of 13-DEC-01. If you need it, there is a complete description of the BLS to L1 Cal Trig cables on the web. Look under:

www.pa.msu.edu/hep/d0/ftp/run1/l1/caltrig/cabling/

at the files such as:

calorimeter_sector_to_bls_rack.txt
calorimeter_sector_to_trigger_phi_index.txt

central_bls_card_to_ctfe_card.txt
central_bls_card_to_ctfe_card_cables.gif

end_cap_bls_card_to_ctfe_card.txt
end_cap_bls_card_to_ctfe_card_cables.gif